# 5.1 Probability: 2-hour Pack

Calculator allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

**Answer ALL questions. Show all your working.**

**1** Two fair six-sided dice are rolled together and the two scores are added.

Score on Dice B

| + | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |

Score on Dice A

Total = Dice A score + Dice B score

**(a)** Find P(the total is 7). **(2)**

.....

**(b)** Find P(the total is at least 10). **(2)**

.....

**(c)** Find P(the total is a multiple of 5). **(2)**

.....


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**2** A biased spinner lands on red, blue, green or yellow only. P(red)=0.15, P(blue)=0.35, P(green)=0.2.

**(a)** Find P(the spinner lands on yellow). **(2)**

.....

**(b)** The spinner is spun 240 times. Work out the expected number of times it lands on blue. **(2)**

.....

**(c)** Find P(the spinner lands on red or green). **(1)**

.....

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**3** A card is chosen at random from a standard pack of 52 playing cards. Work out the probability that it is a red card.

**(2)**

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**4** A spinner can land on red, blue or green. The probability of red is 0.1 and the probability of blue is 0.05. Work out the probability of green.

**(2)**

---

**5** A bag contains 12 counters. 0 of them are orange and the rest are black. A counter is taken at random.
Use one of the words impossible, unlikely, an even chance, likely or certain to describe the probability that the counter is orange.

.....

.....

**(1)**


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**6** A spinner can land on red, blue or green. The probability of red is 0.19 and the probability of blue is 0.05. Work out the probability of green.

**(2)**

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**7** A bag contains 20 counters. 10 of them are red and the rest are green. A counter is taken at random.
Use one of the words impossible, unlikely, an even chance, likely or certain to describe the probability that the counter is red.

**(1)**

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**8** A fair 10-sided spinner numbered 1 to 10 is rolled. Work out the probability of getting a square number. Give your answer as a fraction in its simplest form.

**(2)**

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**9** A fair 8-sided spinner numbered 1 to 8 is rolled. Work out the probability of getting a factor of 12. Give your answer as a fraction in its simplest form.

**(2)**

---

**10** The probability that a train is late is 3/8. Work out the probability that the train is not late.

**(2)**


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**11** The probability that a seed grows into a plant is 1/5. Sam plants 240 seeds. How many plants should he expect?

**(2)**

**12** The probability that a train is late is 1/6. Work out the probability that the train is not late.

**(2)**

**13** The probability that a seed grows into a plant is 9/10. Sam plants 60 seeds. How many plants should he expect?

**(2)**

**14** A bag contains 10 counters. 10 of them are black and the rest are white. A counter is taken at random.
Use one of the words impossible, unlikely, an even chance, likely or certain to describe the probability that the counter is black.

**(1)**

**15** A card is chosen at random from a standard pack of 52 playing cards. Work out the probability that it is a heart.

**(2)**


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**16** A fair 10-sided spinner numbered 1 to 10 is rolled. Work out the probability of getting greater than 4. Give your answer as a fraction in its simplest form.

**(2)**

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**17** A bag contains 8 counters. 6 of them are green and the rest are purple. A counter is taken at random.
Use one of the words impossible, unlikely, an even chance, likely or certain to describe the probability that the counter is green.

**(1)**

---

**18** A fair 10-sided spinner numbered 1 to 10 is rolled. Work out the probability of getting less than 3. Give your answer as a fraction in its simplest form.

**(2)**

---

**19** A bag contains 10 counters. 7 of them are red and the rest are yellow. A counter is taken at random.
Use one of the words impossible, unlikely, an even chance, likely or certain to describe the probability that the counter is red.

**(1)**

---

**20** A card is chosen at random from a standard pack of 52 playing cards. Work out the probability that it is a black queen.

**(2)**


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**21** A bag contains 8 counters. 0 of them are orange and the rest are blue. A counter is taken at random.
Use one of the words impossible, unlikely, an even chance, likely or certain to describe the probability that the counter is orange.

**(1)**

**22** The probability that a bus is on time is 4/5. Over 100 journeys, how many buses are expected to be on time?

**(2)**

**23** A fair 12-sided spinner numbered 1 to 12 is rolled. Work out the probability of getting less than 3. Give your answer as a fraction in its simplest form.

**(2)**

**24** A bag contains 3 white, 7 yellow, 8 green sweets. One is taken at random. Write down the probability that it is white. Give your answer as a fraction in its simplest form.

**(2)**

**25** The probability that a bus is on time is 1/20. Over 500 journeys, how many buses are expected to be on time?

**(2)**


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**26** The probability that Ali wins a game is 0.85. Work out the probability that Ali does not win.

**(2)**

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**27** A card is chosen at random from a standard pack of 52 playing cards. Work out the probability that it is not a club.

**(2)**

---

**28** A spinner can land on red, blue or green. The probability of red is 0.07 and the probability of blue is 0.05. Work out the probability of green.

**(2)**

---

**29** A fair six-sided die is rolled. Work out the probability of getting a multiple of 3. Give your answer as a fraction in its simplest form.

**(2)**

---

**30** A bag contains 2 purple, 3 orange, 5 yellow marbles. One is taken at random. Write down the probability that it is yellow. Give your answer as a fraction in its simplest form.

**(2)**


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**31** A bag contains 20 counters. 20 of them are green and the rest are white. A counter is taken at random.
Use one of the words impossible, unlikely, an even chance, likely or certain to describe the probability that the counter is green.

**(1)**

**32** One letter is chosen at random from the word TOMORROW. Work out the probability that it is a vowel.

**(2)**

**33** A bag contains 6 white, 5 blue, 4 black, 1 red sweets. One is taken at random. Write down the probability that it is white. Give your answer as a fraction in its simplest form.

**(2)**

**34** One letter is chosen at random from the word PARALLELOGRAM. Work out the probability that it is the letter A.

**(2)**

**35** A bag contains 10 counters. 10 of them are orange and the rest are purple. A counter is taken at random.
Use one of the words impossible, unlikely, an even chance, likely or certain to describe the probability that the counter is orange.

**(1)**


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**36** A bag contains 7 orange, 6 black counters. One is taken at random. Write down the probability that it is orange. Give your answer as a fraction in its simplest form.

**(2)**

---

**37** A bag contains 8 purple, 1 black sweets. One is taken at random. Write down the probability that it is black. Give your answer as a fraction in its simplest form.

**(2)**

---

**38** A bag contains only red and blue counters. The probability of picking a red counter at random is 0.6. There are 40 counters in the bag.

**(a)** Find the number of red counters in the bag. **(2)**

.....

**(b)** 5 more blue counters are added to the bag (no red counters are added). Find the new probability of picking a red counter. **(2)**

.....


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**39** Ade drives through two sets of traffic lights on his route to work in Bristol. The two sets of lights act independently. The probability the first light is red is 0.4. The probability the second light is red is 0.25.

**(a)** Find P(both lights are red). **(2)**

**(b)** Find P(neither light is red). **(2)**

**(c)** Find P(exactly one of the two lights is red). **(3)**

**(d)** Show that P(both red) + P(neither red) + P(exactly one red) = 1. **(1)**

**40** A biased coin has P(Heads) = 0.7. The coin is tossed three times.

**(a)** Find P(Heads all three times). **(2)**

**(b)** Find P(at least one Tail in the three tosses). **(2)**

**(c)** Find P(exactly two Heads and one Tail, in any order). **(3)**


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# Mark scheme · 5.1 Probability: 2-hour Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

## Question 1

| | |
|---|---|
| (a) Identifies the 6 combinations giving a total of 7 | M1 |
| (a) 1/6 cao oe (e.g. 6/36) | A1 |
| (a) Answer: **1/6** | |
| (b) Identifies the 6 combinations giving a total of 10, 11 or 12 | M1 |
| (b) 1/6 cao oe (e.g. 6/36) | A1 |
| (b) Answer: **1/6** | |
| (c) Identifies the 7 combinations giving a total of 5 or 10 | M1 |
| (c) 7/36 cao | A1 |
| (c) Answer: **7/36** | |

## Question 2

| | |
|---|---|
| (a) 1 - (0.15+0.35+0.2) (correct method) | M1 |
| (a) 0.3 cao | A1 |
| (a) Answer: **0.3** | |
| (b) 0.35 x 240 (correct method) | M1 |
| (b) 84 cao | A1 |
| (b) Answer: **84** | |
| (c) 0.35 cao, ft (adds mutually exclusive probabilities) | B1 |
| (c) Answer: **0.35** | |

## Question 3

| | |
|---|---|
| 26/52 seen | M1 |
| 1/2 cao | A1 |
| Answer: **1/2** | |

## Question 4

| | |
|---|---|
| 1 - 0.1 - 0.05 or 1 - 0.15 | M1 |
| 0.85 cao | A1 |
| Answer: **0.85** | |

## Question 5

| | |
|---|---|
| impossible cao | B1 |
| Answer: **impossible** | |

## Question 6

| | |
|---|---|
| 1 - 0.19 - 0.05 or 1 - 0.24 | M1 |
| 0.76 cao | A1 |
| Answer: **0.76** | |

## Question 7

| | |
|---|---|
| an even chance cao | B1 |
| Answer: **an even chance** | |

## Question 8

| | |
|---|---|
| identifies favourable outcomes 1, 4, 9 or 3/10 | M1 |
| 3/10 cao | A1 |
| Answer: **3/10** | |

## Question 9

| | |
|---|---|
| identifies favourable outcomes 1, 2, 3, 4, 6 or 5/8 | M1 |
| 5/8 cao | A1 |
| Answer: **5/8** | |

## Question 10

| | |
|---|---|
| 1 - 3/8 | M1 |
| 5/8 cao | A1 |
| Answer: **5/8** | |

## Question 11

| | |
|---|---|
| 1/5 x 240 | M1 |
| 48 cao | A1 |
| Answer: **48** | |

## Question 12

| | |
|---|---|
| 1 - 1/6 | M1 |
| 5/6 cao | A1 |
| Answer: **5/6** | |

## Question 13

| | |
|---|---|
| 9/10 x 60 | M1 |
| 54 cao | A1 |
| Answer: **54** | |

## Question 14

| | |
|---|---|
| certain cao | B1 |
| Answer: **certain** | |

## Question 15

| | |
|---|---|
| 13/52 seen | M1 |
| 1/4 cao | A1 |
| Answer: **1/4** | |

## Question 16

| | |
|---|---|
| identifies favourable outcomes 5, 6, 7, 8, 9, 10 or 6/10 | M1 |
| 3/5 cao | A1 |
| Answer: **3/5** | |

## Question 17

| | |
|---|---|
| likely cao | B1 |
| Answer: **likely** | |

## Question 18

| | |
|---|---|
| identifies favourable outcomes 1, 2 or 2/10 | M1 |
| 1/5 cao | A1 |
| Answer: **1/5** | |

## Question 19

| | |
|---|---|
| likely cao | B1 |
| Answer: **likely** | |

## Question 20

| | |
|---|---|
| 2/52 seen | M1 |
| 1/26 cao | A1 |
| Answer: **1/26** | |


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## Question 21

impossible cao **B1**

Answer: **impossible**

## Question 22

4/5 x 100 **M1**

80 cao **A1**

Answer: **80**

## Question 23

identifies favourable outcomes 1, 2 or 2/12 **M1**

1/6 cao **A1**

Answer: **1/6**

## Question 24

3 out of 18 or 3/18 seen **M1**

1/6 cao **A1**

Answer: **1/6**

## Question 25

1/20 x 500 **M1**

25 cao **A1**

Answer: **25**

## Question 26

1 - 0.85 **M1**

0.15 cao **A1**

Answer: **0.15**

## Question 27

39/52 seen **M1**

3/4 cao **A1**

Answer: **3/4**

## Question 28

1 - 0.07 - 0.05 or 1 - 0.12 **M1**

0.88 cao **A1**

Answer: **0.88**

## Question 29

identifies favourable outcomes 3, 6 or 2/6 **M1**

1/3 cao **A1**

Answer: **1/3**

## Question 30

5 out of 10 or 5/10 seen **M1**

1/2 cao **A1**

Answer: **1/2**

## Question 31

certain cao **B1**

Answer: **certain**

## Question 32

3 vowels out of 8 letters **M1**

3/8 cao **A1**

Answer: **3/8**

## Question 33

6 out of 16 or 6/16 seen **M1**

3/8 cao **A1**

Answer: **3/8**

## Question 34

3 out of 13 **M1**

3/13 cao **A1**

Answer: **3/13**

## Question 35

certain cao **B1**

Answer: **certain**

## Question 36

7 out of 13 or 7/13 seen **M1**

7/13 cao **A1**

Answer: **7/13**

## Question 37

1 out of 9 or 1/9 seen **M1**

1/9 cao **A1**

Answer: **1/9**

## Question 38

(a) 0.6 x 40 (correct method) **M1**

(a) 24 cao **A1**

(a) Answer: **24**

(b) 24/(40+5), ft from part a **M1**

(b) 8/15 cao oe **A1**

(b) Answer: **8/15**

## Question 39

(a) 0.4 x 0.25 (correct method for independent events) **M1**

(a) 0.1 cao **A1**

(a) Answer: **0.1**

(b) 0.6 x 0.75 (correct method) **M1**

(b) 0.45 cao **A1**

(b) Answer: **0.45**

(c) 0.4 x 0.75 (red then not red) **M1**

(c) 0.6 x 0.25 (not red then red) **M1**

(c) 0.45 cao **A1**

(c) Answer: **0.45**

(d) 0.1 + 0.45 + 0.45 = 1 cso, ft from parts (a) to (c) **B1**

(d) Answer: **1**


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## Question 40

| | |
|---|---|
| (a) 0.7 x 0.7 x 0.7 (or $0.7^3$), correct method | **M1** |
| (a) 0.343 cao | **A1** |
| (a) Answer: **0.343** | |
| (b) 1 - 0.343, ft from part a (correct complement method) | **M1** |
| (b) 0.657 cao | **A1** |
| (b) Answer: **0.657** | |
| (c) Identifies the 3 arrangements HHT, HTH, THH | **M1** |
| (c) Each arrangement has probability 0.7 x 0.7 x 0.3 = 0.147 | **M1** |
| (c) 0.441 cao | **A1** |
| (c) Answer: **0.441** | |


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